# React.js Notes – Part 2

Contents

[React.js Notes – Part 2 1](#_Toc113548923)

[Section 5: Rendering Lists & Conditional Content 1](#_Toc113548924)

[63. Module Introduction 1](#_Toc113548925)

[64. Rendering Lists of Data 2](#_Toc113548926)

[65. Using Stateful Lists 30](#_Toc113548927)

[66. Understanding "Keys" 36](#_Toc113548928)

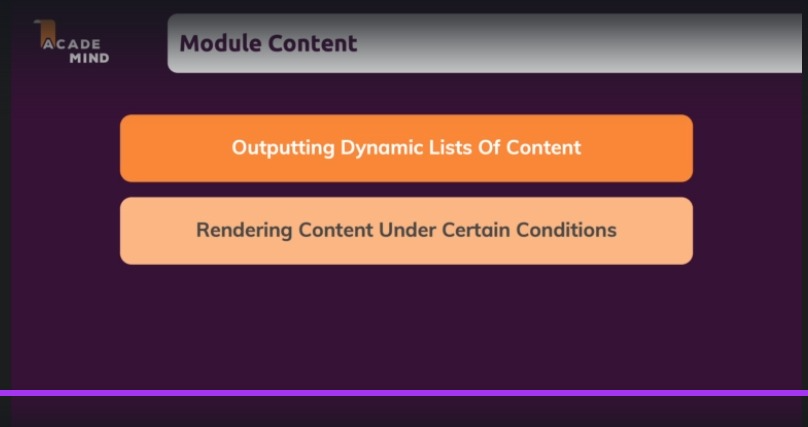
## Section 5: Rendering Lists & Conditional Content

### 63. Module Introduction

In this section, we will dive into rendering lists and conditional content as well as working with really dynamic content. We will look at how we can output arrays of data on our page, and how we can show different content based on different conditions.



This is what we will look at in this module. We will continue working on the application we already started over the last course sections, but in this module, we will finish it by adding these features.



### 64. Rendering Lists of Data

Our list is static currently, not dynamic, meaning that as we add a new item to the form, it's not added to the list.

We want to render our expenses which are defined in App.js. We have an expenses array. We want to render this in the Expenses component. Therefore, the first step is to pass our expenses down via props, which we are already doing. We are passing the items prop,

|  |
| --- |
| src/App.js |
| import React from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const App = () => {  const expenses = [  {  id: "e1",  title: "Toilet Paper",  amount: 94.12,  date: new Date(2020, 7, 14),  },  { id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },  {  id: "e3",  title: "Car Insurance",  amount: 294.67,  date: new Date(2021, 2, 28),  },  {  id: "e4",  title: "New Desk (Wooden)",  amount: 450,  date: new Date(2021, 5, 12),  },  ];  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses **items**={expenses} />  </div>  );  };  export default App; |

which points at this expenses array.

|  |
| --- |
| src/App.js |
| import React from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const App = () => {  const expenses = [  {  id: "e1",  title: "Toilet Paper",  amount: 94.12,  date: new Date(2020, 7, 14),  },  { id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },  {  id: "e3",  title: "Car Insurance",  amount: 294.67,  date: new Date(2021, 2, 28),  },  {  id: "e4",  title: "New Desk (Wooden)",  amount: 450,  date: new Date(2021, 5, 12),  },  ];  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={**expenses**} />  </div>  );  };  export default App; |

So, in the Expenses component, we do get our list of expenses, but we are currently not using that, and that is what we want to change.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

On our props, we have this items prop and the value of that will be that array,

|  |
| --- |
| src/App.js |
| import React from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const App = () => {  const expenses = [  {  id: "e1",  title: "Toilet Paper",  amount: 94.12,  date: new Date(2020, 7, 14),  },  { id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },  {  id: "e3",  title: "Car Insurance",  amount: 294.67,  date: new Date(2021, 2, 28),  },  {  id: "e4",  title: "New Desk (Wooden)",  amount: 450,  date: new Date(2021, 5, 12),  },  ];  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses **items**={expenses} />  </div>  );  };  export default App; |

which we in the end want to render here. But we don't want to output the array as text or anything like that.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  **<ExpenseItem**  **title={props.items[0].title}**  **amount={props.items[0].amount}**  **date={props.items[0].date}**  **/>**  **<ExpenseItem**  **title={props.items[1].title}**  **amount={props.items[1].amount}**  **date={props.items[1].date}**  **/>**  **<ExpenseItem**  **title={props.items[2].title}**  **amount={props.items[2].amount}**  **date={props.items[2].date}**  **/>**  **<ExpenseItem**  **title={props.items[3].title}**  **amount={props.items[3].amount}**  **date={props.items[3].date}**  **/>**  </Card>  </div>  );  };  export default Expenses; |

Instead, we want to render one ExpenseItem per element in the array, and that's straightforward to do.

For this, we first of all need single curly braces, opening and closing, because we want to execute a dynamic expression in our JSX code, and that is done with curly braces. We can execute JavaScript expressions inside of the curly braces.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  **{}**  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

The expression which I do want to execute here is that when I reach out to my array of data, in this case the array of expenses, for every element in the array, we want to create such a JSX element.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {}  **<ExpenseItem**  **title={props.items[0].title}**  **amount={props.items[0].amount}**  **date={props.items[0].date}**  **/>**  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

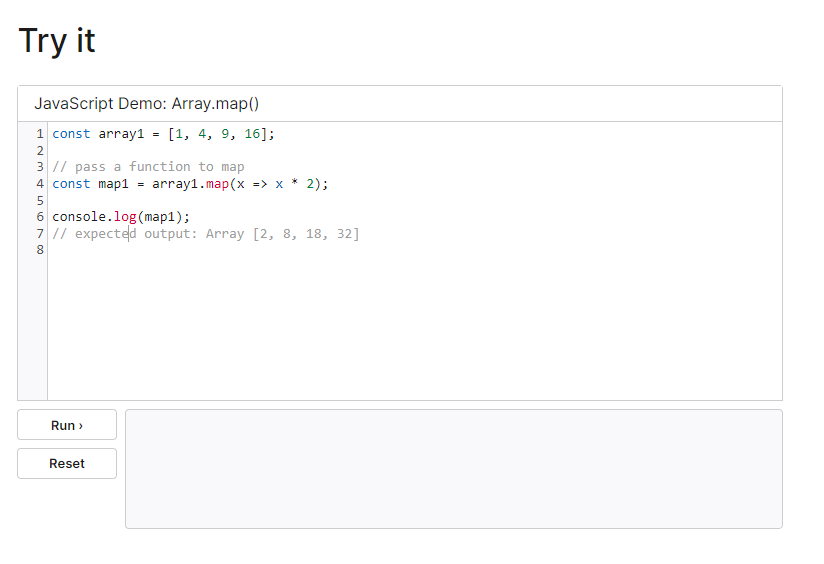
For this, we can access props.items (inside of the curly braces),

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {**props.items**}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

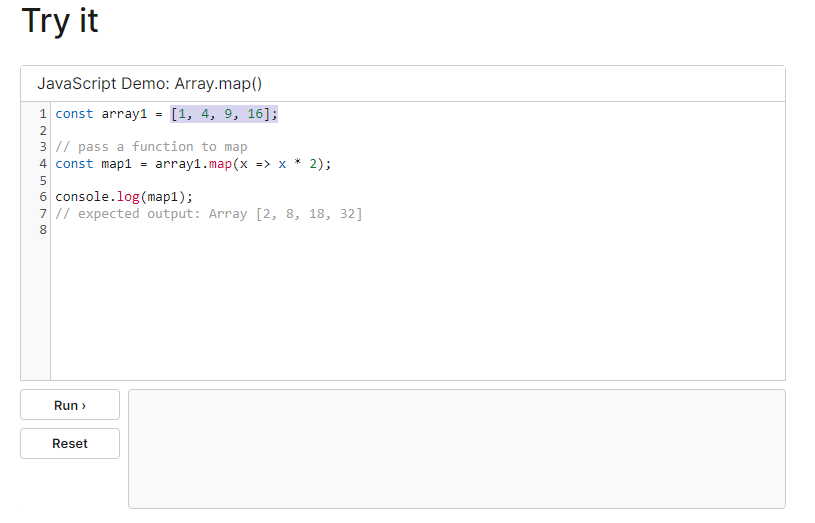
That's our array of items, our array of expenses, and now can use a built in array method, which is built into standard JavaScript, and that's the map method.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items**.map()**}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

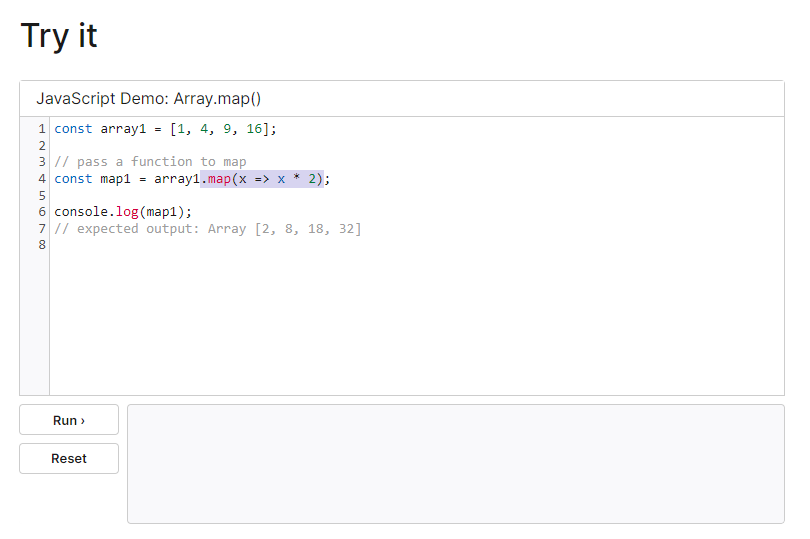
The map() method creates a new array based on another array, and that basically transforms every element in that original array. If we look at some [documentation for the map() method](https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array/map), we see the following example:



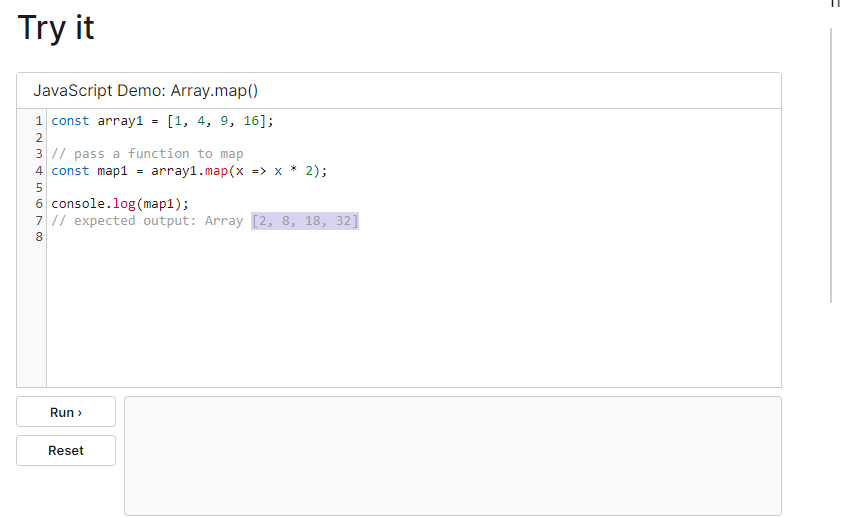
We have an array of numbers,



and with map(), we multiply every number with two,



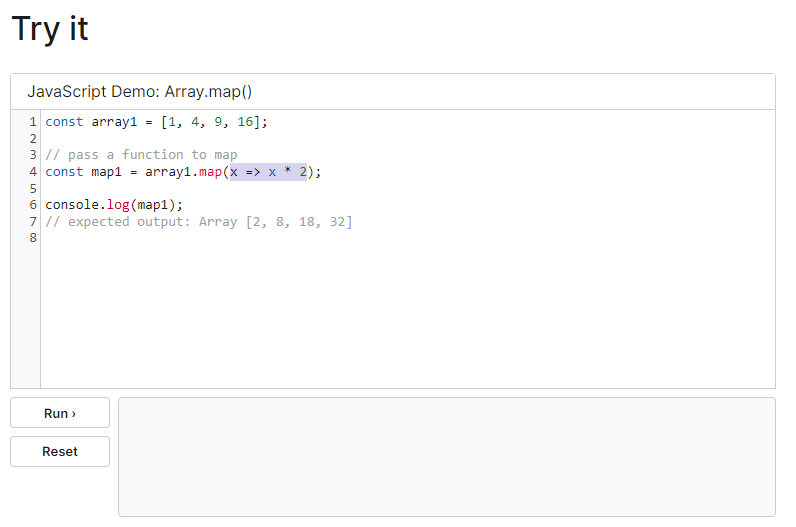
so that we get this new array as a result.



For applying this transformation, map(), this method which we can call,

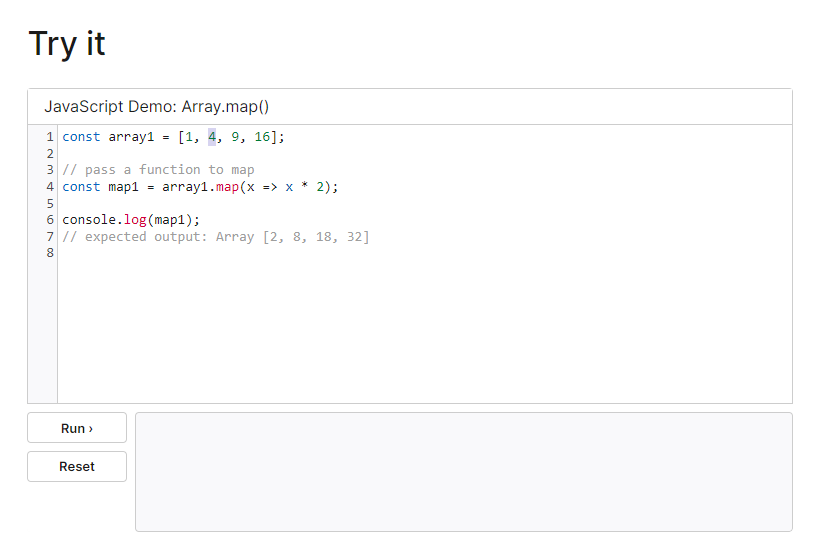


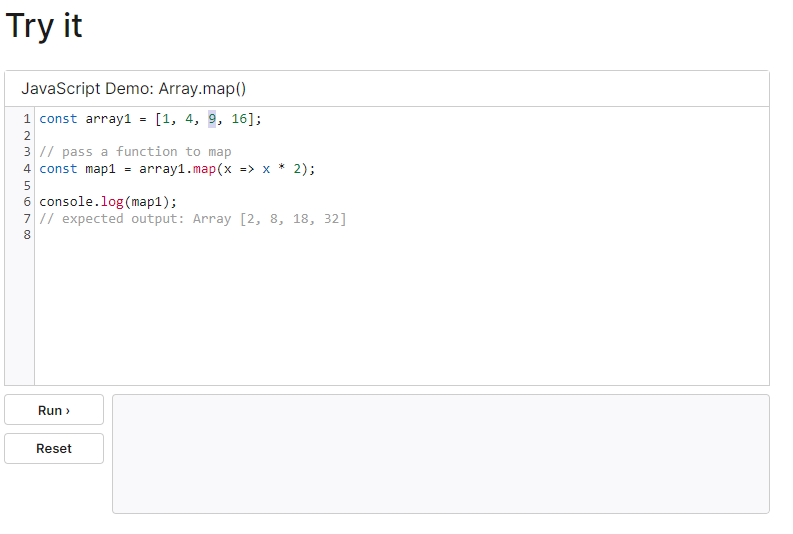
takes a function, which we pass as an argument, and that function is then executed

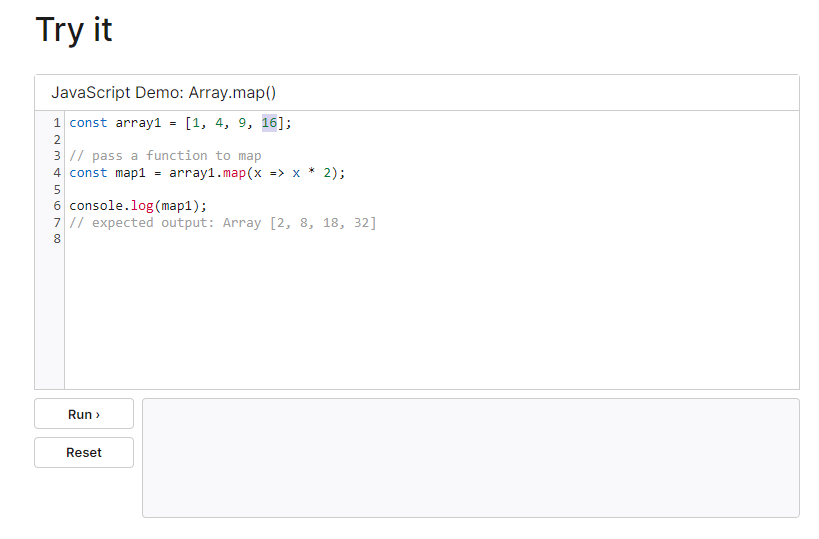


for every item in the array on which we're





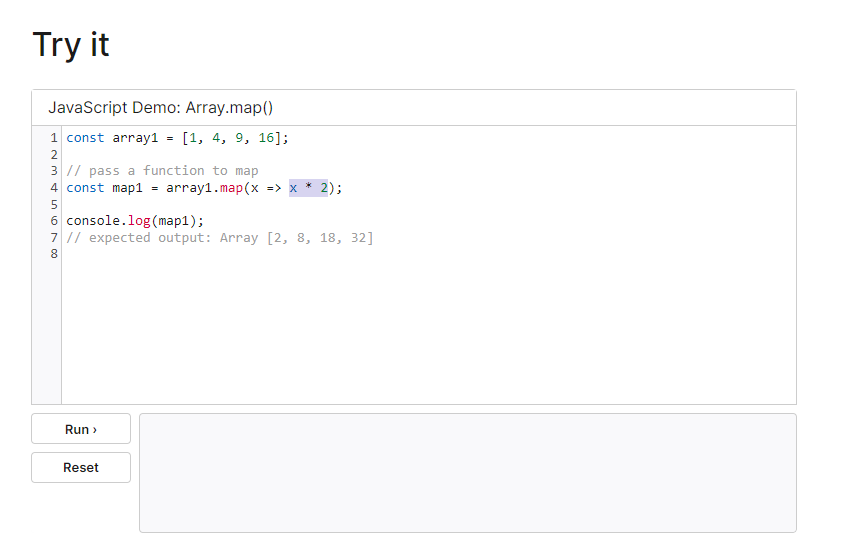




calling map(),



and the result of this function is the element which will be added to the newly created array.



That's how the map() method works. It's a built-in method, and we can utilize it in the Expenses component to transform our array of objects, which we have here,

|  |
| --- |
| src/App.js |
| import React from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const App = () => {  const expenses = **[**  **{**  **id: "e1",**  **title: "Toilet Paper",**  **amount: 94.12,**  **date: new Date(2020, 7, 14),**  **},**  **{ id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },**  **{**  **id: "e3",**  **title: "Car Insurance",**  **amount: 294.67,**  **date: new Date(2021, 2, 28),**  **},**  **{**  **id: "e4",**  **title: "New Desk (Wooden)",**  **amount: 450,**  **date: new Date(2021, 5, 12),**  **},**  **]**;  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={expenses} />  </div>  );  };  export default App; |

into an array of JSX elements, to be precise into an array full of ExpenseItem JSX elements.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map()}  **<ExpenseItem**  **title={props.items[0].title}**  **amount={props.items[0].amount}**  **date={props.items[0].date}**  **/>**  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

If you do output an array of JSX elements here,

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map()}  **{}**  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

like a couple of Cards, then React is capable of simply rendering these elements. If you had something like this, an array of JSX elements as part of your JSX code, React would simply render these elements side by side.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map()}  **{[<Card/>, <Card/>]}**  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

And that's what we utilize here to transform our array of objects into such an array of ExpenseItems, which then are rendered by React.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map**()**}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

So, map takes a function as an argument, and that function executes for every element in the array, and it gets that element for which it's currently executing as a parameter. So here we get our expense, for example, and then

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(**expense** => )}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

in the function body, so on the right side of the arrow, we then have to return the JSX element into which we want to map this expense. So, in this case, I want to map every expense in my expenses array into an ExpenseItem JSX element.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(expense => **<ExpenseItem />**)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

So I want to transform the expense object,

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(**expense** => <ExpenseItem />)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

to this special kind of object, to this JSX element,

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(expense => **<ExpenseItem />**)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

and then we can just configure this as we did it here.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(expense => <ExpenseItem />)}  **<ExpenseItem**  **title={props.items[0].title}**  **amount={props.items[0].amount}**  **date={props.items[0].date}**  **/>**  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

We add a title prop, but the title is now expense.title

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(expense => <ExpenseItem **title={expense.title}** />)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

So, this expense, which is passed as a parameter

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(**expense** => <ExpenseItem title={expense.title} />)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

into this function automatically, because that's how map works,

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(**expense => <ExpenseItem title={expense.title} />**)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

that expense is used

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(**expense** => <ExpenseItem title={expense.title} />)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

to extract the title.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, {useState} from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState('2020');  const filterChangeHandler = selectedYear => {  setFilteredYear(selectedYear);  }  return (  <div>  <Card className="expenses">  <ExpensesFilter selected={filteredYear} onChangeFilter={filterChangeHandler}/>  {props.items.map(expense => <ExpenseItem title={**expense.title**} />)}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

We can also use expense to extract the amount and date.

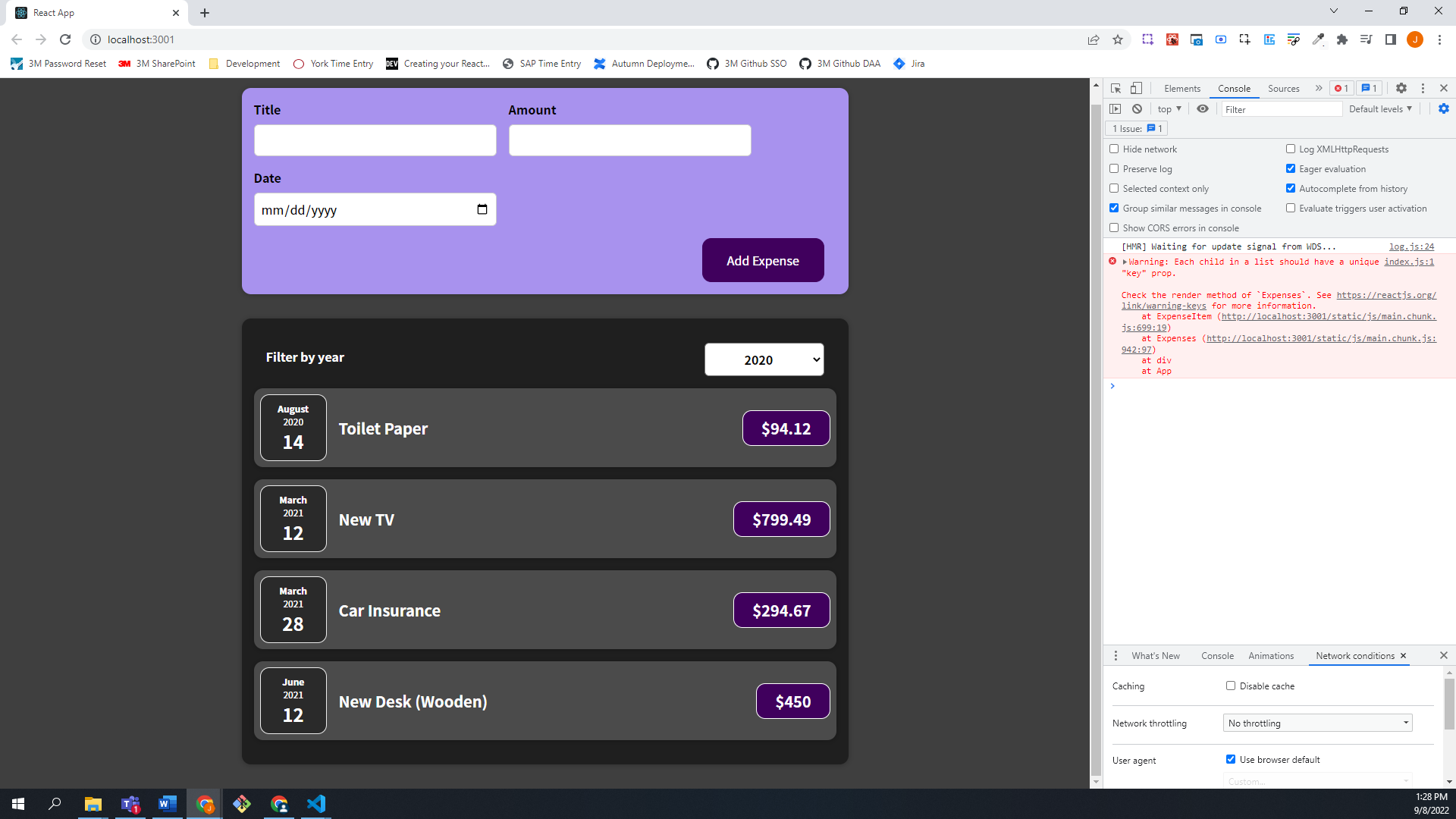
|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, { useState } from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState("2020");  const filterChangeHandler = (selectedYear) => {  setFilteredYear(selectedYear);  };  return (  <div>  <Card className="expenses">  <ExpensesFilter  selected={filteredYear}  onChangeFilter={filterChangeHandler}  />  {props.items.map((expense) => (  <ExpenseItem  title={expense.title}  **amount={expense.amount}**  **date={expense.date}**  />  ))}  <ExpenseItem  title={props.items[0].title}  amount={props.items[0].amount}  date={props.items[0].date}  />  <ExpenseItem  title={props.items[1].title}  amount={props.items[1].amount}  date={props.items[1].date}  />  <ExpenseItem  title={props.items[2].title}  amount={props.items[2].amount}  date={props.items[2].date}  />  <ExpenseItem  title={props.items[3].title}  amount={props.items[3].amount}  date={props.items[3].date}  />  </Card>  </div>  );  };  export default Expenses; |

Now, we can get rid of the hard-coded ExpenseItems here.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, { useState } from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState("2020");  const filterChangeHandler = (selectedYear) => {  setFilteredYear(selectedYear);  };  return (  <div>  <Card className="expenses">  <ExpensesFilter  selected={filteredYear}  onChangeFilter={filterChangeHandler}  />  {props.items.map((expense) => (  <ExpenseItem  title={expense.title}  amount={expense.amount}  date={expense.date}  />  ))}  ~~<ExpenseItem~~  ~~title={props.items[0].title}~~  ~~amount={props.items[0].amount}~~  ~~date={props.items[0].date}~~  ~~/>~~  ~~<ExpenseItem~~  ~~title={props.items[1].title}~~  ~~amount={props.items[1].amount}~~  ~~date={props.items[1].date}~~  ~~/>~~  ~~<ExpenseItem~~  ~~title={props.items[2].title}~~  ~~amount={props.items[2].amount}~~  ~~date={props.items[2].date}~~  ~~/>~~  ~~<ExpenseItem~~  ~~title={props.items[3].title}~~  ~~amount={props.items[3].amount}~~  ~~date={props.items[3].date}~~  ~~/>~~  </Card>  </div>  );  };  export default Expenses; |

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, { useState } from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState("2020");  const filterChangeHandler = (selectedYear) => {  setFilteredYear(selectedYear);  };  return (  <div>  <Card className="expenses">  <ExpensesFilter  selected={filteredYear}  onChangeFilter={filterChangeHandler}  />  {props.items.map((expense) => (  <ExpenseItem  title={expense.title}  amount={expense.amount}  date={expense.date}  />  ))}  </Card>  </div>  );  };  export default Expenses; |

If we now save this and reload the webpage, we get a warning, which we can ignore for now. We also see that we get all these items being rendered just as before but now it's actually happening dynamically, which simply means that now it's based on the actual array. This means that we can now also change the array and such changes will be reflected in that list, which is going to be what's talked about in the next lecture.



### 65. Using Stateful Lists

How can we now update this expenses array whenever a new expense is being added? For this we need to go to App.js because that is where we have the expenses array as well as the function addExpenseHandler, which is triggered whenever a new expense is added.

What we have to do is add this expense to

|  |
| --- |
| src/App.js |
| import React from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const App = () => {  const expenses = [  {  id: "e1",  title: "Toilet Paper",  amount: 94.12,  date: new Date(2020, 7, 14),  },  { id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },  {  id: "e3",  title: "Car Insurance",  amount: 294.67,  date: new Date(2021, 2, 28),  },  {  id: "e4",  title: "New Desk (Wooden)",  amount: 450,  date: new Date(2021, 5, 12),  },  ];  const addExpenseHandler = **expense** => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={expenses} />  </div>  );  };  export default App; |

this expenses array. However, if we just add it, React won't update the component. Instead, to get React to update the component, you need to use state.

|  |
| --- |
| src/App.js |
| import React from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const App = () => {  **const expenses = [**  **{**  **id: "e1",**  **title: "Toilet Paper",**  **amount: 94.12,**  **date: new Date(2020, 7, 14),**  **},**  **{ id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },**  **{**  **id: "e3",**  **title: "Car Insurance",**  **amount: 294.67,**  **date: new Date(2021, 2, 28),**  **},**  **{**  **id: "e4",**  **title: "New Desk (Wooden)",**  **amount: 450,**  **date: new Date(2021, 5, 12),**  **},**  **];**  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={expenses} />  </div>  );  };  export default App; |

Now in App.js we want to import useState.

|  |
| --- |
| src/App.js |
| import React, **{useState}** from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const App = () => {  const expenses = [  {  id: "e1",  title: "Toilet Paper",  amount: 94.12,  date: new Date(2020, 7, 14),  },  { id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },  {  id: "e3",  title: "Car Insurance",  amount: 294.67,  date: new Date(2021, 2, 28),  },  {  id: "e4",  title: "New Desk (Wooden)",  amount: 450,  date: new Date(2021, 5, 12),  },  ];  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={expenses} />  </div>  );  };  export default App; |

We will actually grab the expenses array, extract it out of the App component function, store it above the App component function declaration, and name it DUMMY\_EXPENSES, as this is just some dummy data that we can use to initialize our state with.

|  |
| --- |
| src/App.js |
| import React, {useState} from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  **const DUMMY\_EXPENSES = [**  **{**  **id: "e1",**  **title: "Toilet Paper",**  **amount: 94.12,**  **date: new Date(2020, 7, 14),**  **},**  **{ id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },**  **{**  **id: "e3",**  **title: "Car Insurance",**  **amount: 294.67,**  **date: new Date(2021, 2, 28),**  **},**  **{**  **id: "e4",**  **title: "New Desk (Wooden)",**  **amount: 450,**  **date: new Date(2021, 5, 12),**  **},**  **];**  const App = () => {  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={expenses} />  </div>  );  };  export default App; |

Inside of the App component function, we call useState, and I'll pass DUMMY\_EXPENSES as an initial state value, so that we have some initial expenses to display. We can then use destructuring to get access to the expenses and to the setExpenses state updating function.

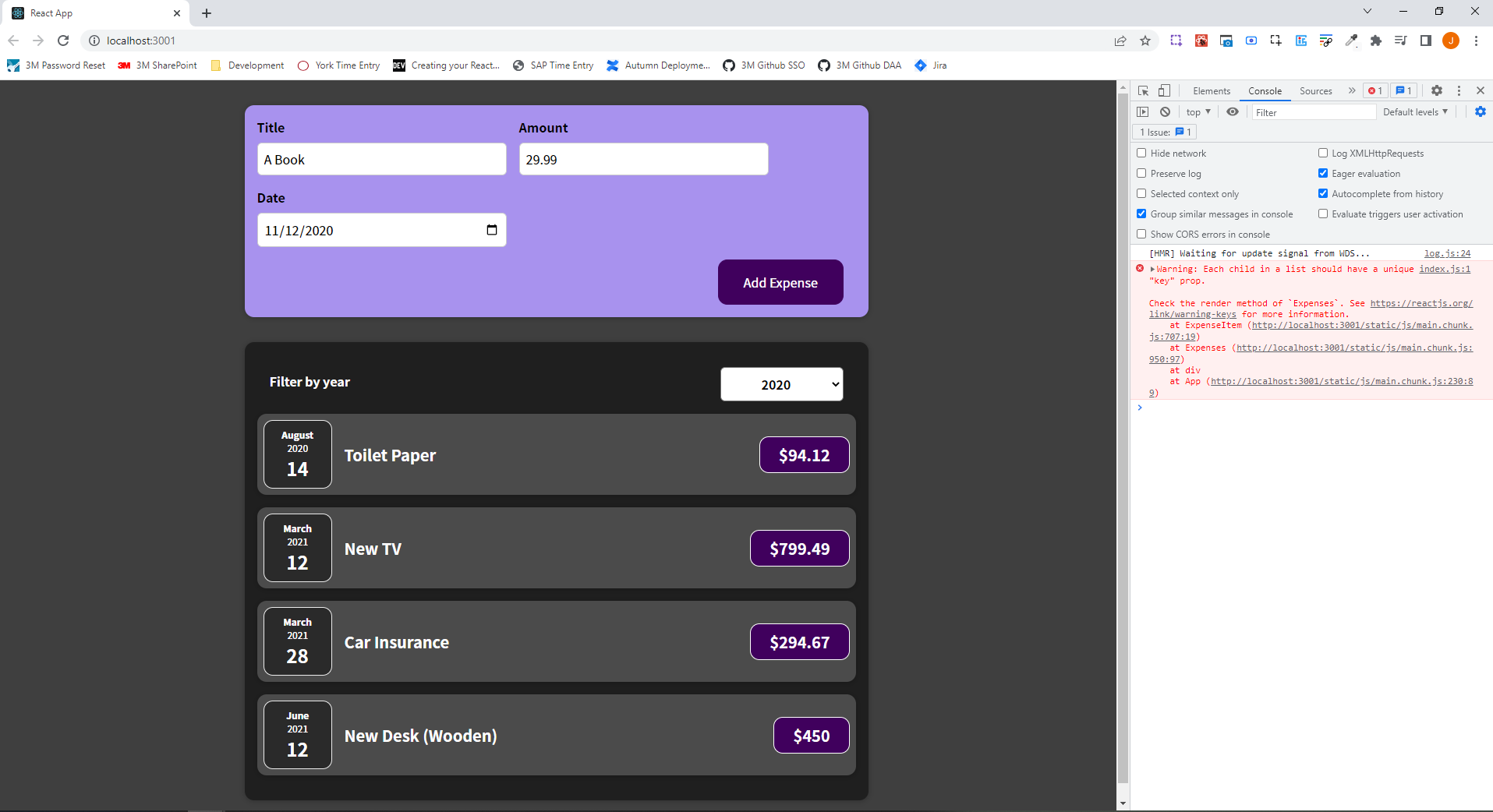
|  |
| --- |
| src/App.js |
| import React, {useState} from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const DUMMY\_EXPENSES = [  {  id: "e1",  title: "Toilet Paper",  amount: 94.12,  date: new Date(2020, 7, 14),  },  { id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },  {  id: "e3",  title: "Car Insurance",  amount: 294.67,  date: new Date(2021, 2, 28),  },  {  id: "e4",  title: "New Desk (Wooden)",  amount: 450,  date: new Date(2021, 5, 12),  },  ];  const App = () => {  **const [expenses, setExpenses] = useState(DUMMY\_EXPENSES);**  const addExpenseHandler = expense => {  console.log('In App.js');  console.log(expense);  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={expenses} />  </div>  );  };  export default App; |

In the function addExpenseHandler, we can now remove the console.log() statements. In the function addExpenseHandler, where we want to add a new expense, we can then call setExpenses to set our expenses array to a new array which includes the new expense. Inside of setExpenses, we will update the state based on the previous state, or the previous snapshot of this state. As we learned, we should use the special function form for this state updating function, so it would be passed a function as an argument to this state updating function, and that function will automatically receive the latest state snapshot. So here we would then get our prevExpenses automatically by react and we would return our new array where we add this expense, which we're getting as a parameter here, and where we then add our prevExpenses with the spread operator.

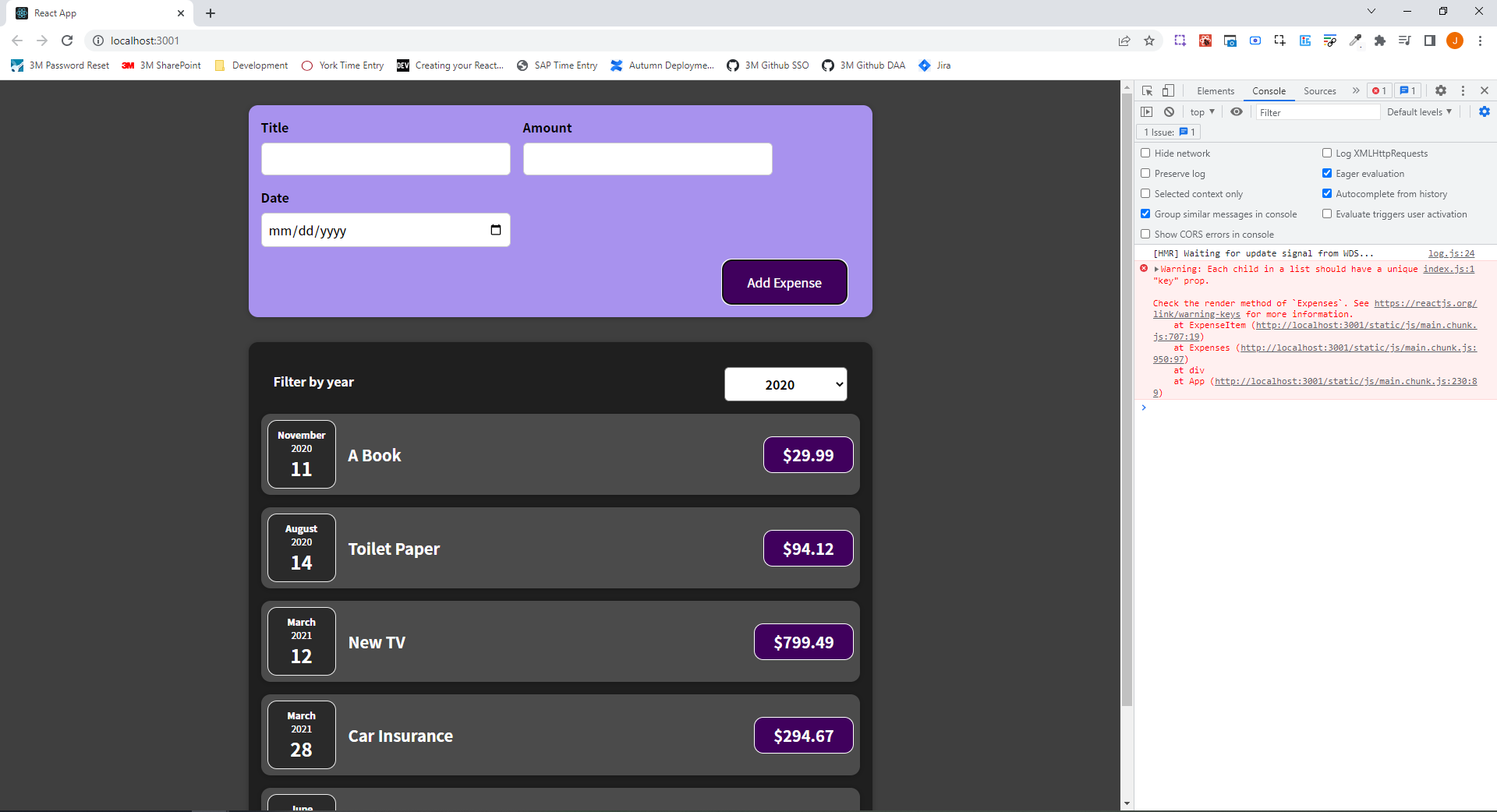
|  |
| --- |
| src/App.js |
| import React, {useState} from "react";  import NewExpense from "./components/NewExpense/NewExpense";  import Expenses from "./components/Expenses/Expenses";  const DUMMY\_EXPENSES = [  {  id: "e1",  title: "Toilet Paper",  amount: 94.12,  date: new Date(2020, 7, 14),  },  { id: "e2", title: "New TV", amount: 799.49, date: new Date(2021, 2, 12) },  {  id: "e3",  title: "Car Insurance",  amount: 294.67,  date: new Date(2021, 2, 28),  },  {  id: "e4",  title: "New Desk (Wooden)",  amount: 450,  date: new Date(2021, 5, 12),  },  ];  const App = () => {  const [expenses, setExpenses] = useState(DUMMY\_EXPENSES);  const addExpenseHandler = expense => {  **setExpenses((prevExpenses) => {**  **return [expense, ...prevExpenses];**  **});**  }  return (  <div>  <NewExpense onAddExpense={addExpenseHandler}/>  <Expenses items={expenses } />  </div>  );  };  export default App; |

We should now have a dynamic list, which automatically updates when items are added.

So now in the browser, if we refresh the page and we now add a book for $29.99, pick some date, and click "Add Expense",

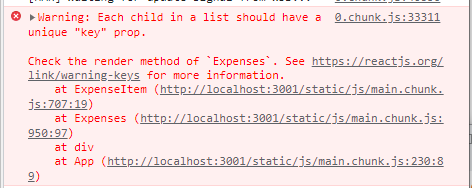


We will see A Book added as the first item. So now this is working and is truly a dynamic list by using state and by outputting the items using the map()method.



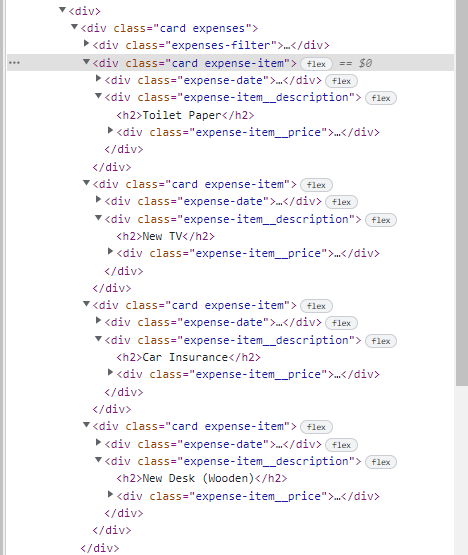
### 66. Understanding "Keys"

Why are we getting this "Key" warning? It looks like everything works.



Well React has a special concept when it comes to rendering lists of data, a concept which exists to ensure that React is able to update and render such lists efficiently without performance losses, or bugs, which may occur.

If we select the Elements tab in the Developer Tools, and hover over the list of items, we will see multiple divs representing each ExpenseItem.

****

If we add a new item, React renders this new item as the last item in the list of div's and updates all items and replaces their content, such that it again matches the order of the items in my Array. This is not great. This is happening because to React all of these items look similar, and it only sees that my Array changed; that my array is now longer than before. And, hence, it simply renders an additional div, and it adds that at the end. It then walks through all of the items and updates the content inside of every item to match the Array content again. The final result is correct but from a performance perspective, this is not great because all items are visited and updated, and it can even lead to bugs.

If the ExpenseItems would be stateful items and we would have some state managed inside of that, then if, for example, our first item, if it has a certain state, if we add a new item, the old first item would be overwritten with the new first item. Hence, any state changes we might’ve had in there would be lost. So besides potential performance issues, we could also run into bugs.

We have a way of telling React where a new item should be added. We do that by going to the place where we output our list of items,

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, { useState } from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState("2020");  const filterChangeHandler = (selectedYear) => {  setFilteredYear(selectedYear);  };  return (  <div>  <Card className="expenses">  <ExpensesFilter  selected={filteredYear}  onChangeFilter={filterChangeHandler}  />  **{props.items.map((expense) => (**  **<ExpenseItem**  **title={expense.title}**  **amount={expense.amount}**  **date={expense.date}**  **/>**  **))}**  </Card>  </div>  );  };  export default Expenses; |

We then add a special prop to this ExpenseItem here, and that's the key prop. The key prop is not a prop that we are using inside of ExpenseItem, but instead it's a prop you can add to any component no matter if it's a custom component by you or it's a built-in HTML element, you can always add this. And if you add the key prop, then you can help React identify the individual items. To identify the individual items, you need to set a unique value per list item, and that for example in this case here, would be expense.id because in the array called DUMMY\_EXPENSES holding our initial expenses, every item has a unique ID.

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, { useState } from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState("2020");  const filterChangeHandler = (selectedYear) => {  setFilteredYear(selectedYear);  };  return (  <div>  <Card className="expenses">  <ExpensesFilter  selected={filteredYear}  onChangeFilter={filterChangeHandler}  />  {props.items.map((expense) => (  <ExpenseItem  **key={expense.id}**  title={expense.title}  amount={expense.amount}  date={expense.date}  />  ))}  </Card>  </div>  );  };  export default Expenses; |

If you did not have a unique ID, you could use the second argument which you get here for the function you pass to map(), which is an automatically managed index. Though, it is discouraged to use that since with that you can still run into bugs because the index for a given item is always the same and not directly attached to the content of the item. For the ID that's different, as every item with certain content has a clear unique ID.

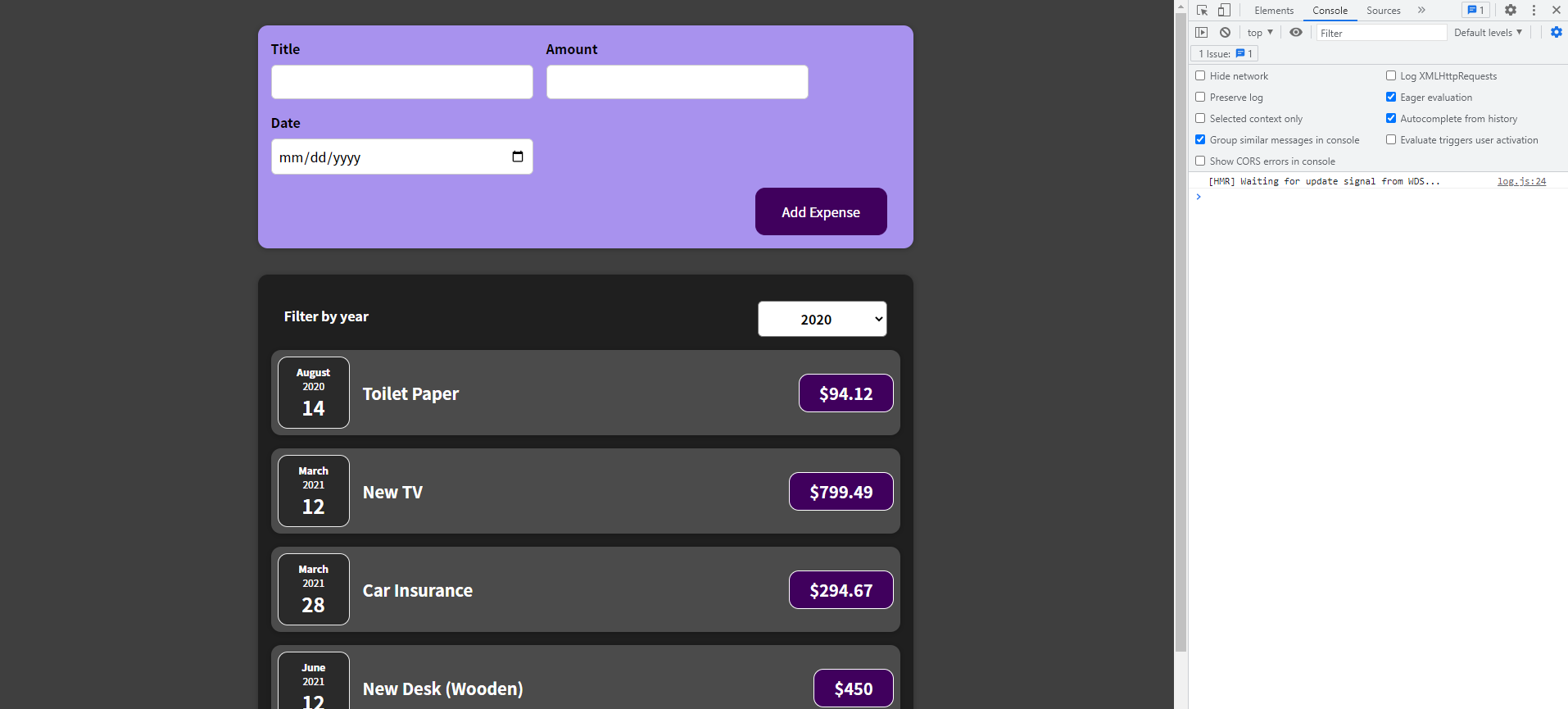
|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, { useState } from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState("2020");  const filterChangeHandler = (selectedYear) => {  setFilteredYear(selectedYear);  };  return (  <div>  <Card className="expenses">  <ExpensesFilter  selected={filteredYear}  onChangeFilter={filterChangeHandler}  />  {props.items.map((expense, **index**) => (  <ExpenseItem  key={**index**}  title={expense.title}  amount={expense.amount}  date={expense.date}  />  ))}  </Card>  </div>  );  };  export default Expenses; |

In reality, it turns out that in most scenarios you do have some unique ID because typically you are rendering some data which comes from a database or anything like that. And there you work with unique IDs anyway. So finding some unique identifier is no problem, and you can use any primitive value as a unique identifier.

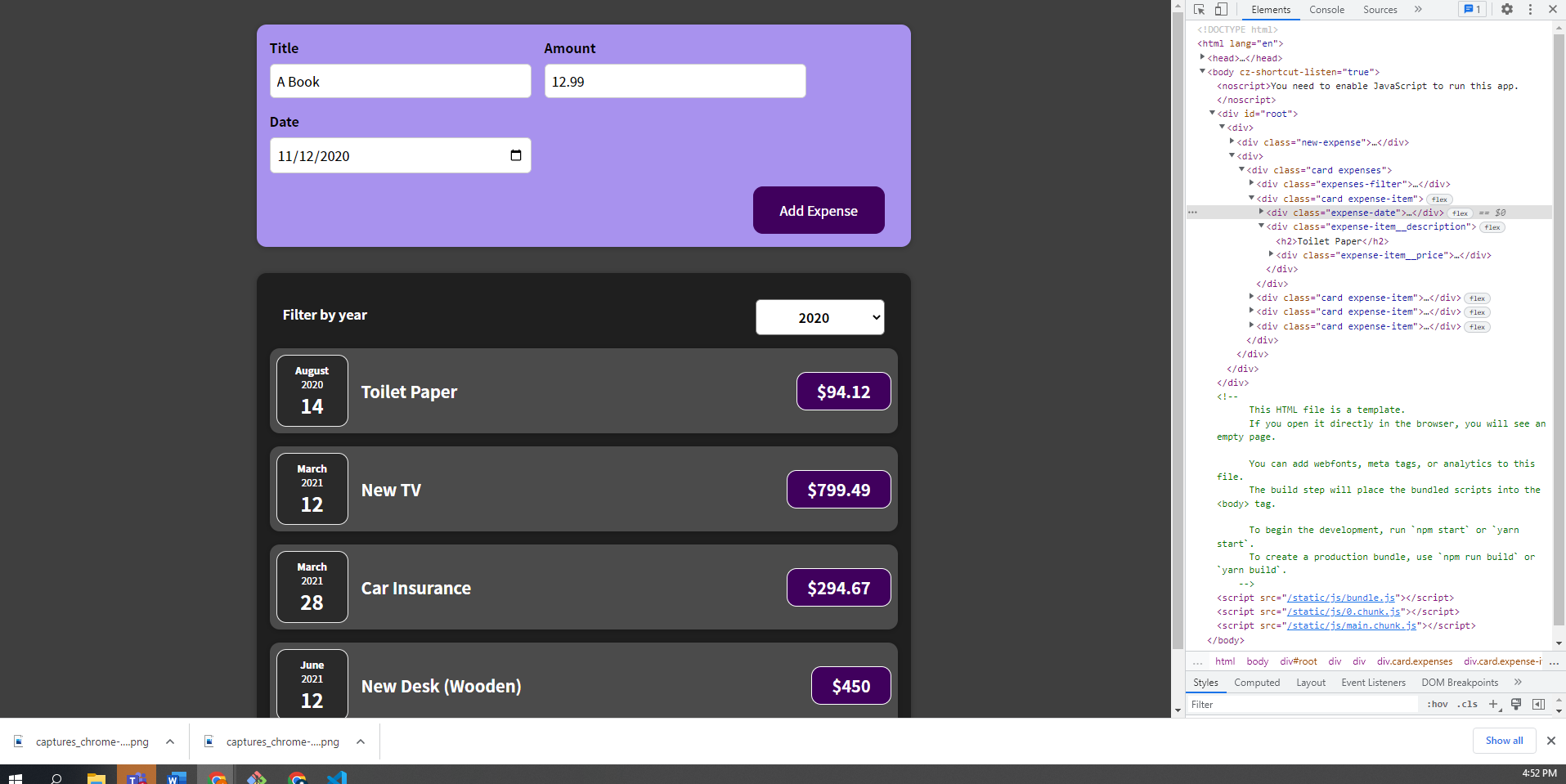
Now, with the key prop pointing at expense.id,

|  |
| --- |
| src/components/Expenses/Expenses.js |
| import React, { useState } from "react";  import ExpenseItem from "./ExpenseItem";  import ExpensesFilter from "./ExpensesFilter";  import Card from "../UI/Card";  import "./Expenses.css";  const Expenses = (props) => {  const [filteredYear, setFilteredYear] = useState("2020");  const filterChangeHandler = (selectedYear) => {  setFilteredYear(selectedYear);  };  return (  <div>  <Card className="expenses">  <ExpensesFilter  selected={filteredYear}  onChangeFilter={filterChangeHandler}  />  {props.items.map((expense) => (  <ExpenseItem  **key={expense.id}**  title={expense.title}  amount={expense.amount}  date={expense.date}  />  ))}  </Card>  </div>  );  };  export default Expenses; |

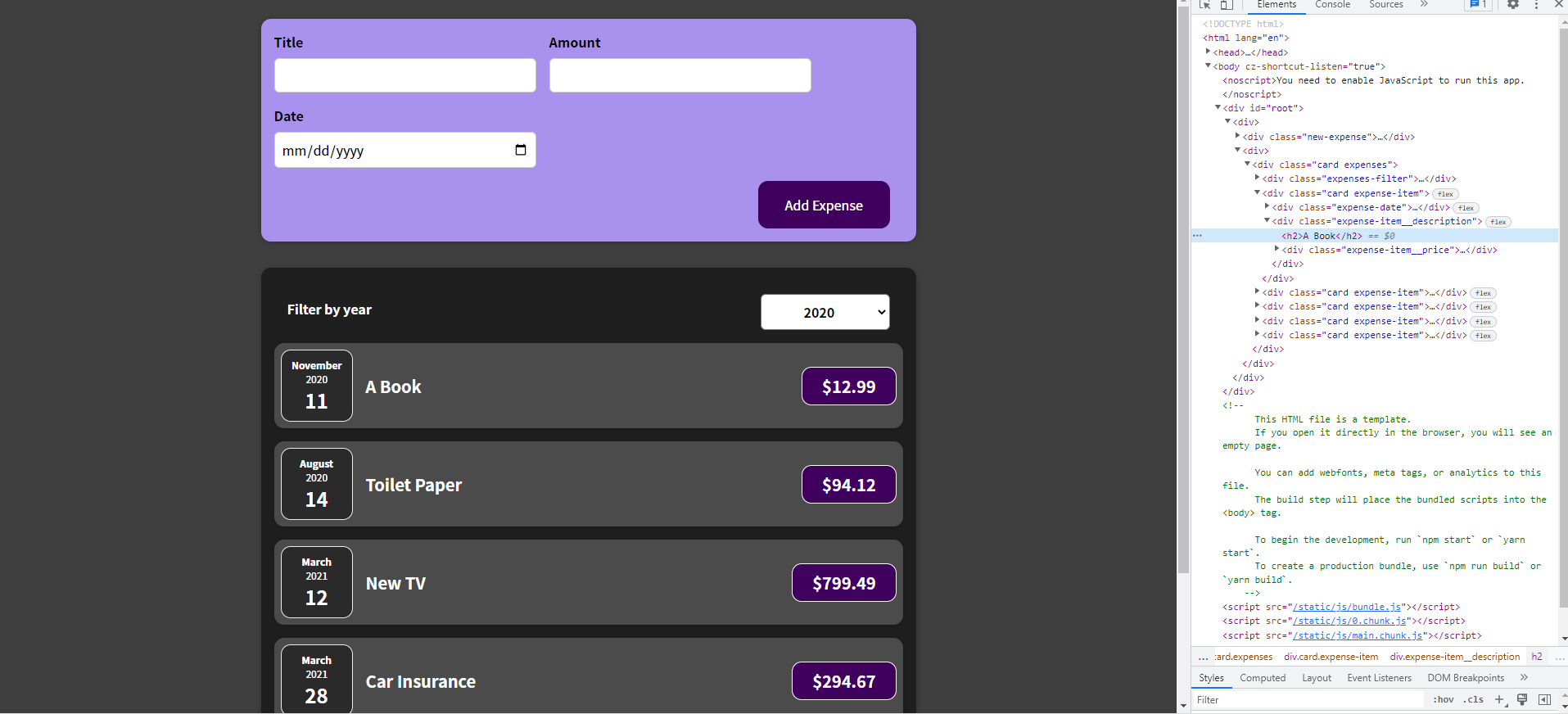
if we reload the page, we no longer get that warning.



If we inspect the first item in the list and add a new expense,



We see the div with the item just added at the beginning of the list of divs correctly, as it should be, because now React is able to uniquely identify all these items, and it is therefore aware, not just how long the array is, but also which items should be placed. It's also able to update this list in a more efficient manner.



You should always add a key prop when mapping out lists of items.